

### REMARKS

Claims 1, 3, 5-9 and 27-30 have been amended. Claim 2 has been canceled without prejudice. Subsequent to the entry of the present amendment, claims 1, 3-24 and 27--30 are pending and at issue. These amendments and additions add no new matter as the claim language is fully supported by the specification and original claims.

#### I. Rejections under 35 U.S.C. §102

Claims 1-24 and 27-30 are rejected under 35 U.S.C. §102(a) as allegedly anticipated by Bastiaans (U.S. Patent No. 4,735,906, hereinafter, "Bastiaans"). Applicants respectfully traverse the rejection as it applies to the amended claims.

Claim 1 has been amended with the limitations of claim 2 and also been amended to clarify that the "electrodes have at least one functionalized surface". Claim 27 has been amended to clarify that the "first piezoelectric resonator is sandwiched between a pair of first electrodes, wherein the first-electrodes have a first surface functionalized with a first type of biomolecules". These amendments are supported in the specification, for example at paragraph [0028], where it states that the "exposed surface of electrode 121 is functionalized with a layer 140 of biologically active or derivatized material". In addition, claims 3 and 28 have been amended to clarify that the second piezoelectric resonator includes electrodes having a non-functionalized surface.

A rejection of claims under 35 U.S.C. §102 is improper unless each and every element of the claimed subject matter is found, either expressly or inherently described, in a single prior art reference (Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987); MPEP §2131).

The Office Action alleges that "Bastiaans anticipates a sensing device, *inter alia*, comprising: a piezoelectric resonator (e.g., 18) having a functionalized surface for sensing; and a second resonator (e.g., 19)". Bastiaans disclose a sensor 10 having a piezoelectric crystal 12

with a central sensing region 18 and electrodes 14 and 16 on either side (Bastiaans, col. 3, lines 44-68 and Fig. 1). An antigen or antibody may be chemically bonded to the sensing region 18 to selectively react with the material to be measured (Bastiaans, col. 4, lines 12-46), making a functionalized surface on the sensing region 18 of the piezoelectric crystal 12. In contrast, the functionalized surface in the present invention is on the electrodes. Nowhere in Bastiaans is it disclosed that the electrodes include a functionalized surface, as required in amended claims 1 and 27. As such, Bastiaans does not teach each and every element of amended claims 1 and 27.

Bastiaans also disclose a second sensor 11 identical to sensor 10 except that sensing region 19 of the piezoelectric crystal 13 is prepared to be generally unreactive with any of the substances of the test solution (Bastiaans, col. 4, lines 55-61), making a non-functionalized surface on the sensing region 19 of the piezoelectric crystal 13. In contrast, non-functionalized surface in the present invention is on the electrodes. Nowhere in Bastiaans is it disclosed that electrodes of the second sensor include a non-functionalized surface, as required in amended claims 3 and 28. As such, Bastiaans does not teach each and every element of amended claims 3 and 28.

Bastiaans also discloses that the first sensor 10 and the second sensor 11 are each coupled to their own wave generator 20 (i.e. control circuitry) with high gain RF amplifier, (Bastiaans, col 4, lines 1-6, lines 55-64, Fig. 1). In contrast, the present invention discloses the use of one control circuitry to control both piezoelectric resonators when they are in use, such as in claim 3 ("the control circuitry is configured to apply the excitation signal to the additional pair of electrodes"). Nowhere in Bastiaans is it disclosed to use only one control circuitry for both sensors. As such, Bastiaans does not teach each and every element of claim 3.

As shown above, Applicants assert that Bastiaans does not disclose each and every element of the claims. Accordingly, withdrawal of rejection of claims 1-24 and 27-30 under 35 U.S.C. §102 is respectfully requested.

In re Application of:  
Zhang et al.  
Application No.: 10/749,529  
Filed: December 30, 2003  
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PATENT  
Atty Docket No.: INTEL1180 (P16227)

## **II. Information Disclosure Statement**

Applicants respectfully request that an initialed copy of the PTO-1449 filed with the Information Disclosure Statement on November 15, 2004 be returned indicating that the Examiner has reviewed the references submitted therewith.

## **III. Conclusion**

In view of the amendments and above remarks, it is submitted that the claims are in condition for allowance, and a notice to that effect is respectfully requested. The Examiner is invited to contact Applicant's undersigned representative if there are any questions relating to this application.

No fee is deemed necessary with the filing of this paper. However if any fees are due, the Commissioner is hereby authorized to charge any fees, or make any credits, to Deposit Account No. 07-1896 referencing the above-identified attorney docket number. A copy of the Transmittal Sheet is enclosed.

Respectfully submitted,

Date: June 5, 2006



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